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THE USE OF IMMEDIATE RESPONSE SYSTEMS IN JUNIOR COLLEGE.

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IMMEDIATE RESPONSE SYSTEMS MAY BE AN EFFECTIVE MEANS OF INDIVIDUALIZING INSTRUCTION AND OF HELPING THE INSTRUCTOR TO EVALUATE THE PROGRESS OF HIS STUDENTS. SUCH A SYSTEM PROVIDES FOR CONTINUOUS ACTIVE RESPONSE, THE IMMEDIATE KNOWLEDGE OF THE RESULTS OF A RESPONSE, AND THE POSSIBILITY OF CORRECTING ERRONEOUS RESPONSES BEFORE PROCEEDING. THE BASIC EQUIPMENT IS A SET OF INDIVIDUAL STUDENT RESPONDERS AND A TEACHER'S CONSOLE ON WHICH THE RESPONSE OF EACH STUDENT IS INDICATED. SYSTEMS MAY ALSO INCLUDE MEANS OF ANALYZING THE NUMBERS OF CORRECT RESPONSES IN A CLASS, PROVIDING PRINTOUTS OF INDIVIDUAL OR GROUP RECORDS, AND ENGRAVING OF STUDENT ANSWERS (PAUSING RECORDING ONLY THE CRITICAL RESPONSE) IN ORDER TO PROVIDE ADEQUATE FEEDBACK. OTHER DESIRABLE FEATURES ARE (1) PRIVACY, SO THAT ONE STUDENT'S RESPONSE CANNOT BE OBSERVED BY ANOTHER, (2) PROVISION FOR WEIGHTING OF QUESTIONS, (3) SIMPLICITY OF OPERATION, AND (4) ADAPTABILITY TO ADDITION OF MORE SOPHISTICATED UNITS. SEVERAL TYPES OF INSTALLATION ARE DESCRIBED AND ILLUSTRATED. (AO)

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IN

JUNIOR COLLEGE

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THE USE OF IMMEDIATE RESPONSE SYSTEMS

IN

JUNIOR COLLEGE

In Partial Fulfillment of Requirements for

Education 261D

[University of California, Los Angeles
School of Education]

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INTRODUCTION

With the arrival of increasing quantities of students into the junior college, many problems arise. The classes get larger, the amount of individual attention smaller and not the least of the problems is the drop-out rate. Either teachers must be hired at the beginning of the semester to try to teach students who may drop out of school a month or so later or else enrollment must be limited and students screened. With the open door policy in California, the latter is not always possible (at the present time). There are numerous studies in process at the present time on ways to reduce the drop-out problem. One way may be to individualize instruction so that the student has a better chance of success. Another way may be to help the teacher so that he or she may realize the exact point at which students "get lost" and possibly feel they can no longer profitably remain in class.

The use of an immediate response system may be one method which could be used to help with the above. Such a system provides for continuous active response, the immediate knowledge of the results of such a response, and possibility of correcting erroneous responses before proceeding.[3]

The basic equipment of student response systems is essentially the same-individual student responders on which the student indicates his choice and a teacher console on which the student response is indicated in some way or another.

THE RESELER RESPONSE EVALUATION SYSTEM (1)

This system consists of three modules, each of which is engineered to function in combination with the others. It is however possible to start with the first module and add others at a latter date.

The first module, the Group Communicator, is the basic unit. It consists of two units: the student responder unit and the monitor unit (the teachers console).

The student answers questions by turning a knob on his student responder unit until a letter A,B,C,D, or E shows in the aperture. There is also an off position which indicates no response. A narrow angle lens covers the aperture assuring privacy.

The group monitor unit has five instant-reading meters which show what percentage of the class has responded with answers A,B,C,D, or E. A Student Light Array simulates the class seating arrangement. As each question is asked, the teacher can immediately see each individual's response by activating the selector switch. The standard unit will handle a class up to 100 students.

An optional feature is the Teacher Control Console. With this, the teacher can assign a point value to each question. When the Group Monitor Unit is connected to the Raw Score Totalizer and the Group Profile Recorder, information giving students' assigned point values is automatically relayed.

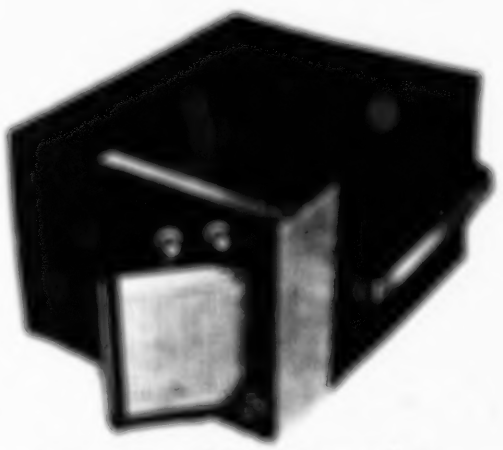
Module two consists of the Raw Score Totalizer. As questions are asked and answered, each student's score is accumulated on individual electronic counters. At the conclusion of the test, the teacher presses the print-and-reset button and scores are automatically transferred to a printed tape. Each student is identified by a number and total points accumulated are shown. The scores can be known while the class is still in session and as many as 100 students can be scored with this unit. Attendance can be taken with this unit. It does not indicate which questions were answered incorrectly. This can be observed visually on the student light array after each question or module three can be used.

Module three is the Group Profile Recorder. It records choices of each student for each question on a single permanent chart. It is produced by a separate electronically actuated stylus for each student. It can be programmed to record correct answers only, if desired. The Group Profile Recorder has a twenty student capacity. Its capacity can be extended to as much as 100, in multiples of 20. Additional equipment is

Teacher's Console

Raw Score Totalizer

Student Responder



Group Profile Recorder

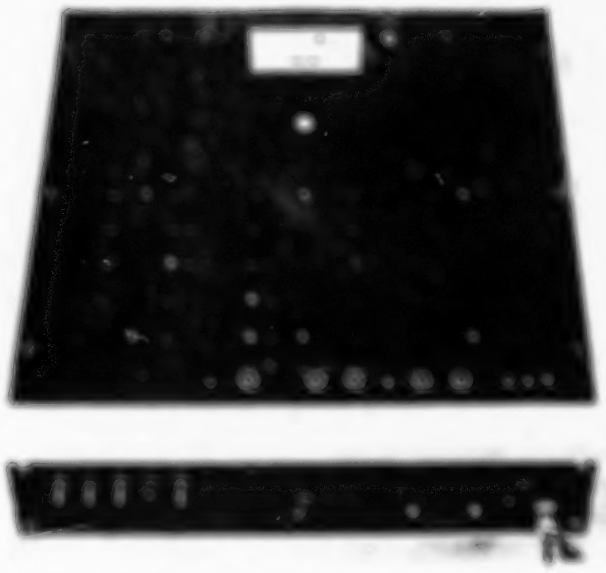
necessary. This is a portable unit which can be moved to any desired class or lecture hall.

To my knowledge, there is no installation on the West Coast and further information was unattainable at this time.

THE INSTRUCTOSCOPE (13)

The Instructoscope has a teacher's console which indicates student responses by means of green lights (right answers) and red lights (wrong answers) for individual students. There is one dial which indicates the percentage of right answers to a question. A slide projector is generally connected to the teacher's console which can be operated from that position. The projector can project multiple choice questions and answer slides which are coded to indicate correct or incorrect both at the student's station as well as the instructor's console. The student's station contains a multiple choice dial with five positions. The student moves to the position which he believes to be correct and then depresses the button to record his choice. A green light shows if the answer is correct, and red if incorrect. If a wrong answer is given, the dial may be turned to give the correct answer which is indicated by a yellow light. This does not change the original selection at the teacher's console. With this student responder, the selected answer is seen through a prism arrangement which prevents side or top viewing. So there is no way of knowing what another student

INSTRUCTOSCOPE



Teacher's Console

Student Responder

has answered and cheating is reduced.

Auxiliary recording and print-out equipment is available. This provides for a printed record of individual and total class responses. Attendance can be taken with this system.

Pasadena City College, Pasadena, California, has at least two class rooms which are equipped with Instructoscopes and more are planned. One large class room used mainly for social science classes has 48 stations. This room has a slanted floor and student responders are mounted at intervals in long curving tables. The teacher console is mounted in front from which the slide projector is operated by remote control. The slide projector is mounted at the rear of the room. Another classroom is used for teaching in the technical arts program.

THE EDEX SYSTEM (8)

With the EDEX system, there are several choices of teacher console equipment. The simplest has only a light panel which indicates individual response to the question. The lights on the panel may be arranged to fit a particular classroom seating plan and a seating chart may be placed over the light panel for easy student identification.

There are four selector keys (A,B,C,and D) and a telephone-type dial for the instructor's use. She is able to turn on individual lights by selecting one of these 4 keys.

The telephone-type dial is for dialing in assigned values. In this way, she is able to determine which wrong answers were given by individual students. The individual lights array is automatically activated whenever the instructor utilizes the weighted score controls. Four group scores can be added. These show the percentage of the class responding A,B,C, and D to questions asked by the teacher. These scores are self-adjusting so that they always reflect a 100% total for any class size.

Individual score counters are available for recording cumulative progress. This is a cumulative digital computer device connecting each student responder. It has a capacity of counting 999 individual counting pulses. The instructor is able to accumulate scores for each correct response by selecting the correct response with the same A,B,C,D buttons used for the light panel operation. The desired, weighted score may be on the controls. Either at the end of the lesson or at specified points, the instructor must record the counter totals of correct responses for all students. A "print-out" device is available that the entered percentages are most appropriately entered down as they occur if a record of them is to be kept.

A multimedia system is also available. In this case projection equipment may be controlled either manually or automatically from the instructor's console. The multimedia

Control Console has a two-track audio tape unit which normally carries the audio portion of the lesson unit, but it also controls an inaudible command system that automatically operates devices such as motion picture, slide, and filmstrip projectors. The light array is not present in this model. Other devices such as room lamps, classroom speaker systems, and buzzers may be operated automatically by various plug-in adapters.

The student responders are normally a push-button device, with five buttons, A,B,C,D and an "OFF" button that clears the responder, making it ready for the next question. Both free-standing and built-in units are available. Rotary selection types are also available, and for special applications other types can be made available. The responder and associated circuitry are so designed that the student may change his choice of answer up to the point where the teacher finds it the correct answer.

It is possible to use ESD equipment in multiples with groups numbering nearly 1,000. This introduces new problems and variables that do not exist in the smaller classroom. One problem is based on the size of the group and the resultant number of possible answers to a multiple choice. This problem is solved by utilizing a data acquisition and recording system which records information instantaneously on either punch tape or directly onto magnetic tape to be used with an inertia-

Communicator Console with
individual Student Responders

tional computer. This system is programmed to give class attendance, individual student identification, individual percentile score, individual accumulative percentile score, item analysis, and test profile.

Foothill College has an EDEX system which is linked to a paper tape puncher and a computer.[2] There are two hundred and forty seats in the lecture hall. At the teacher's command, an electronic scanner records the student's selections on the tape which is processed by a computer. Disadvantages of this system are the possibility of mechanical breakdown, the absence of actual test cards marked by student, and the greater opportunity for cheating.

At another installation I visited, the letters on the student responders had worn off to a great extent. The letters were simply printed on the buttons and not etched in.

In the use of the EDEX with elementary school children,[11] an interesting problem occurred. During a series of tests using binary choices, it became apparent that the problem so far as the student was concerned was "Is everybody else leaving the A (or B) button pushed down, or is everybody else changing to the other button?" This was solved by having the student return to a neutral button after each choice was scored.

Dr. B. Lamar Johnson in his forthcoming book "Islands of Innovation Expanded"[16] cites other junior colleges

using EDEX equipment, Henry Ford Community College in Michigan has a 70 station installation which is used primarily for nursing. Monterey Peninsula, California uses an EDEX for mathematics and chemistry. In 1966-67, Meramec Community College, St. Louis, installed a 100 station unit for experimental use. The multimedia system was used. There are plans to use computers in connection with the system. Student responses are not only reported instantly to instructors but are also stored on tape or IBM cards. The computers will be used to make item analyses of examination questions, making diagnostic print-outs for individual students, and ranking student performance.

Los Angeles Trade Tech is planning two installations for use in electronics and auto-mechanics. The faculty has been encouraged to develop plans to use the EDEX in achieving the objectives of their course.

It has been reported [12] that work is being done which hopefully will lead to an integrated series of self-contained and tested programs for music listening.

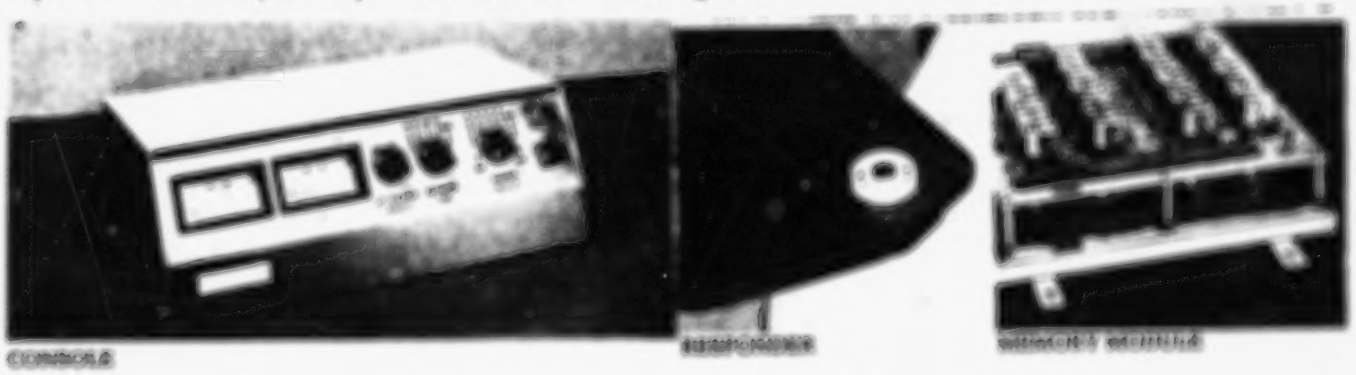
THE LITTON STUDENT RESPONSE SYSTEM[7]

The Litton Student Response System consists of three components - instructors console, student responder, and memory module. A recorder which makes a permanent record of individual student responses can be obtained. The instructor's console has two meters which indicate the percentage of

students responding correctly. There are also simple controls needed to operate the system. The controls can be adjusted for classroom attendance, set the desired student response time, and select the correct answer to the question.

The student responder consists of a dial that may be turned to five possible answers (A,B,C,D and E). Each appear twice. The student turns to the desired letter and presses the response button. If the student has chosen the right answer, the button will vibrate. If he has selected the wrong answer, he may then select alternate answers. Only the student's first answers are indicated on the instructor's console. The memory module stores, adds the student's first responses and transmits them to meters on the instructor's console.

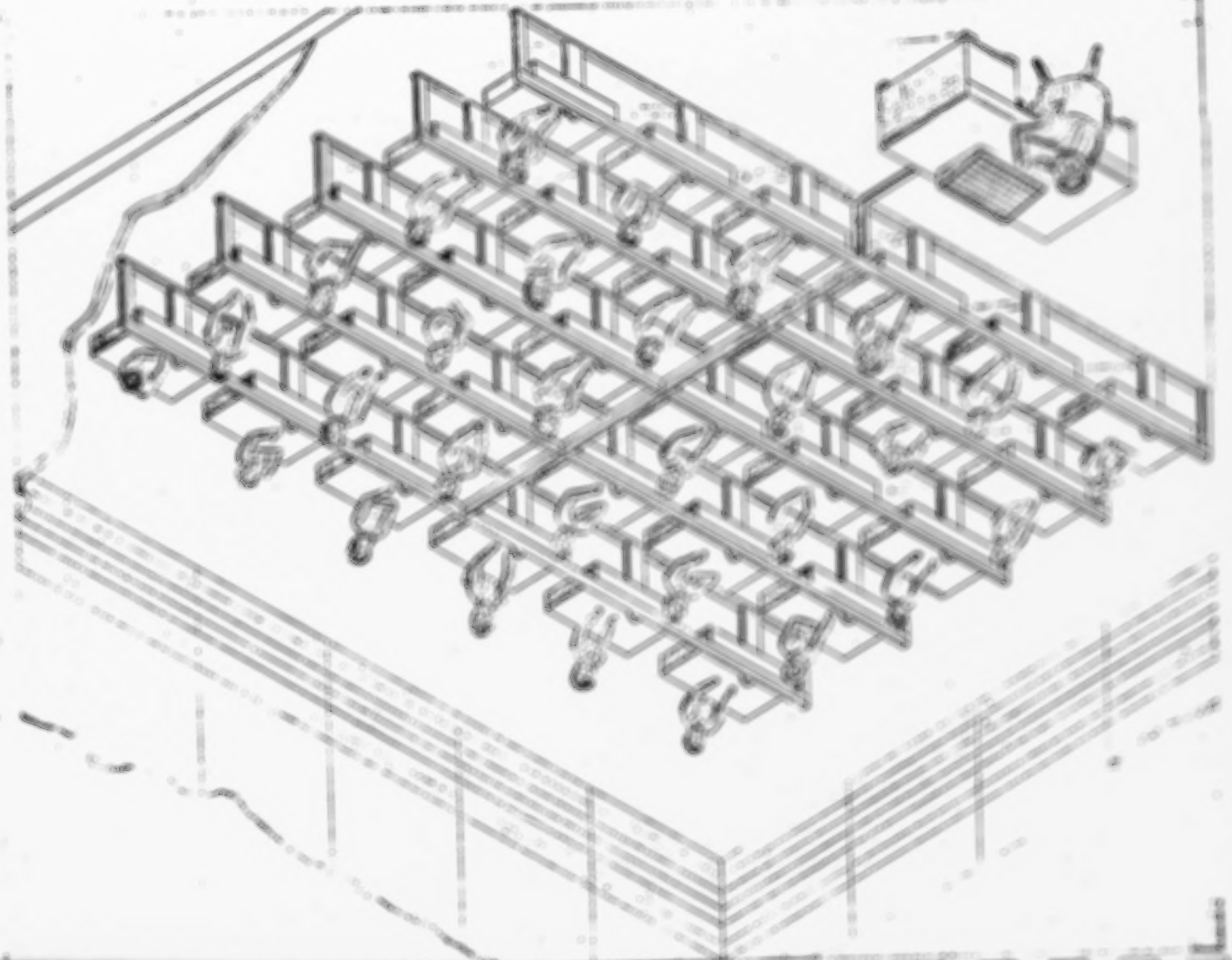
Advantages of this system are simple operation, immediate feedback to the instructor and student, remote control capability and manual or automatic timing of the response period. This is a new system and I have no knowledge of any working installations. The system is the outcome of the Teletest system developed by Dr. R. E. Corrigan. [3,4]



THE MCMAHAN ELECTRONIC ENGINEERING CLASSROOM RESPONDER

Information on this system was supplied by conversation with and unpublished information from George McMahan. The student's position is equipped with a visibly shielded five-position switch. The instructor's console has five lights for each student position which light up to designate the student's selection. A meter somewhat like an applause meter is attached and when this indicates an acceptable degree of comprehension on the part of the student the teacher may proceed.

If a commercial computer is available, the classroom responder can be augmented with a Model 525 IBM scanning device, the output of which can be fed into a Mach 10 tape punch typewriter. The output can be fed into a card reader, the responses tabulated and recorded on cards.



SELECTION OF A STUDENT RESPONSE SYSTEM

The selection of a student response system depends upon many things. An important factor is of course, the amount of money which is available and the amount of sophistication desired. It would appear that there are probably certain essential features which would be desirable in any system. It should be a permanent installation with wires placed so they are not accessible to students. If a room is to be converted to this use, a sub-floor is one possibility. The student responders should be of such a nature that one student's selection could not be observed by another student. The device should tell the student and instructor immediately if the student has the right answer. There should be some way of taking student attendance. There should be meters for indicating student's choices so that the instructor will know the percentage with the right answer and which answers might be confusing the students. There should be a way for accumulating totals of student's correct answers and some method of giving weight to different questions. There should be a printout record of correct answers or some other method of quickly obtaining this information. With a normal 50 minute break between classes, there would not be time to copy totals from meters for some 50 students. Concise operating instructions should be available. As a whole, the equipment should be simple to operate so as not to inhibit its use by as many

teachers as possible.

The unit should be of such construction that more sophisticated units could be added at a latter date as need and familiarity with the basic equipment develops.

CRITERIA FOR USE OF A STUDENT RESPONSE SYSTEM

Teachers give as reasons for wanting such a system: "It will save me time". "It will relieve me from secretarial duties such as role taking". "It will save time grading examinations". "I will be able to give short quizzes more frequently". If by "saving time" is meant the above reasons stated I would agree but as a whole, it may require more time, at least in the beginning. Dr. R. E. Corrigan[(2)] states,

> "The system does not save teacher time. To properly prepare the instructional sequence for the first unit requires a significant amount of time because the lesson plans center on student performance objectives rather than on subject matter coverage. Programming may require ten times more teacher time initially, but once the has prepared the materials, she may proceed in her learning strategy to assure pre-established individual student achievement."

R. F. Mager[(10)] believes that,

> "The more able the machine to carry out human purposes and the more precisely designed the media to serve the human learning process--the more that will be demanded of the human institution. Institution waiting on the part of teachers and students will become more critical because of improved feedback systems by which the results of their actions become immediately known."

Three vital considerations have been listed.[11] First, there must be a clear idea of the skill or concept to be taught in terms of measurable student objectives. Second, there must be a logical series of experiences to build this. And third, there must be some way of evaluating whether this skill or concept has been obtained. No machine can "teach" above the level of the material it is supplied. This is particularly important if the multi-media aspect is used in connection with the system and tapes are used. Teachers have found sequencing and pacing sometimes difficult.[12] Everything which the student is to experience or do must be provided for in the tapes themselves. The amount of time needed for answering questions proved to be of considerable importance.

The planning and preparation involved in the use of any of these systems is the key to its effectiveness. If this is properly done, a student response system has many advantages. The instructor immediately knows which students know the material, and she can decide where or not to proceed with further information. She is able to give short tests more frequently, and this will require more consistent preparation on the part of the student. Many students drop mathematics and science courses because they fall behind. Hopefully, such a system, as above, will bring these students to the instructor's attention more quickly and remedial work can be done early enough.

Others using this system report[3] that student day-dreaming was cut to a minimum. Also,[12] students who entered class reluctantly became more interested as the period progressed and attempted to answer all the questions. Students reported[4] that they liked knowing the right answer immediately, that they studied more because they couldn't change their minds, and that things were learned easier and faster. They didn't like having to wait until everyone had answered before going on; they sometimes punched the wrong button accidently; and some needed more time to think about the answers.

CONCLUSION

The use of a student response system has certain advantages if used correctly. Since the initial use of such a system requires considerable preparation on the part of the instructor, this should be taken into consideration by the school system which intends to install such a system. In order to justify the expenditure involved, the system should be used as much as possible by as many instructors as possible.

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